PATENT SPECIFICATION

DRAWINGS ATTACHED

Inventor: OLAF JOHN BARCLAY ORWIN

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COMPLETE SPECIFICATION

Improvements in or relating to Conveyors for Conveying Goods

We, FISHER & LUDLOW LIMITED, a British Company, of Bordesley Works, Clyde Street, Birmingham, 12, in the County of Warwick, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to conveyors for conveying goods and is concerned with such conveyors which are of the endless belt type.

One of the objects of the present invention is to provide a new or improved endless belt conveyor for the foregoing purpose which can readily be built up from a number of units to various desired overall lengths in which the construction is a particularly simple and inexpensive one and which permits of the assembly being built up in a particularly simple manner.

With this object in view, according to one feature of this invention, we provide an endless belt conveyor, comprising a plurality of belt-supporting units, each unit consisting of a rigid frame and belt-supporting means carried by said frame, means connecting said units in end-to-end relationship to form a belt-supporting structure, a belt drive unit and a belt tensioning unit, and means connecting said belt drive and belt tensioning units respectively to opposite ends of said structure, so that said belt drive and belt tensioning units are carried solely by and from the end unit frames, and an endless conveyor belt extending between said belt drive and tensioning units and having its upper load conveying run carried by said belt-supporting means of said assembled belt-supporting units.

In such an arrangement the belt-supporting units may embody one or more skid plates for supporting the upper or load carrying run of the endless belt, but preferably the belt-supporting units are provided with rollers for supporting this run of the endless belt, and arising from this preferred form of the invention, a further object of the invention is the provision of an endless belt conveyor which is constructed from a number of gravity type roller conveyor units.

With this specific object in view according to a further feature of this invention, we provide an endless belt conveyor consisting of a plurality of gravity roller conveyor units, each comprising a frame and a plurality of goods-supporting rollers which are mounted rotatably thereon and are spaced apart from one another by a distance sufficiently small as to permit of said units constituting a gravity conveyor when disposed at the appropriate inclination to the horizontal, an endless conveyor belt, the upper run of which is adapted to be supported by said plurality of gravity roller conveyor units acting as belt-supporting sectional frame units, and means for detachably connecting together said gravity roller conveyor units in end-to-end relationship, a belt driving unit and a belt tensioning unit together with means for attaching said belt driving and belt tensioning units to the opposite ends of the assembled gravity roller conveyor units so as to be supported therefrom, as opposed to being supported directly from the floor or other external support.

In such latter arrangement the gravity roller conveyor units would, in fact, constitute belt-supporting units in so far as the rollers thereof supported the upper run of the belt, and in either form of the invention these belt-supporting units may be carried directly from the floor or other external support but preferably they would be mounted on supporting elements adapted to be attached to the units, which supporting elements would preferably embody rollers for supporting the lower or return run of the belt at intervals along the length of the installation.

The arrangement may accordingly be such that the weight of the entire installation, including that of the driving and belt tensioning units, may be transmitted to the floor or other external support through the said supporting elements.

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If desired, means may be provided for connecting the belt-supporting units pivotally together so as to permit of different units being disposed at different inclinations to the horizontal, or, if desired, of some units being horizontal and one or more units being at an inclination to the horizontal for the purpose of transporting a load between different levels.

The means for attaching the driving and tensioning units to the belt-supporting units would preferably comprise the provision of outwardly extending flanges on said belt-supporting units, adapted detachably to receive clips provided on the belt driving and tensioning units so as to secure the latter to the supporting-units and this same arrangement may be employed for securing the supporting-elements referred to to the belt-supporting units, namely the provision on the supporting elements of these clips.

These clips would preferably be of resilient form and may embody screws or bolts for securing a resilient jaw of each clip in engagement with one side, preferably the upper side, of what would then be a horizontally outwardly extending flange.

The invention will now be more particularly described with reference to the accompanying drawings wherein: —

Figure 1 is a side elevation showing in general arrangement a conveyor constructed in accordance with the present invention.

Figure 2 is a plan view of a typical belt-supporting unit showing the bracing thereof and with the rollers removed.

Figure 3 is a fragmentary elevational view showing the fixing of one end of a bracing member.

Figure 4 is a fragmentary elevational view showing the jointing of two adjacent belt-supporting units.

Figure 5 shows an alternative arrangement for jointing together two adjacent belt-supporting units.

Figure 6 is a cross sectional view on the line 6—6 of Figure 5.

Figure 7 is a fragmentary sectional elevation showing method of connecting a belt-supporting unit to the belt drive unit.

Figure 8 is an elevation showing a fixed type of supporting element provided with a roller for supporting the return strand of the endless belt.

Figure 9 is a fragmentary elevational view showing an alternative form of supporting element, this being of a tilting type.

Figures 10 and 11 are side elevations and plan respectively of an inverse bend assembly for joining together two adjacent relatively inclined belt-supporting units.

Figures 12 and 13 are side elevation and plan respectively of a convertor unit assembly, again for joining together two adjacent and relatively inclined belt-supporting units.

Referring now to the drawings, which illustrate one particular arrangement in which each belt-supporting unit is constituted by a gravity roller conveyor unit, the conveyor comprises one or more of said belt-supporting units 10 (see Figure 1), a belt drive unit 11, and belt tensioning unit 12, together with a plurality of supports or supporting elements 13, the belt drive unit 11 and belt tensioning unit 12 being respectively supported from the ends of adjacent belt-supporting units 10 and not being directly supported by the supporting elements 13, as will be seen from Figure 1.

Each belt-supporting unit in the form of a gravity roller conveyor unit is of generally conventional form and comprises, as may be seen in Figure 2, the supporting frame consisting of a pair of longitudinal side members 14, formed of sheet metal and bent to channel configuration with the connecting portions or webs of the channels disposed vertically and the mouths of the channels facing away from each other. A large number of conveyor rollers (not shown in Figure 2) of any known form are arranged at the customary close spacing, e.g. at 4" to 6" pitch, dependent on the diameter of the rollers, said rollers being mounted between the upper parts of the webs of the channels 14 so as to be mounted for rotation about spaced parallel axes in the known manner.

The upper flange of each channel 14 is bent downwardly and inwardly, as may be seen particularly in Figures 3, 6, 7 and 8, opposite the ends of the roller axles to locate these against undesirable lateral movement after the two channels 14 have been joined together by cross bracing, whilst the lower flange is bent back upon itself so as to be of double thickness and provide a relatively rigid attachment flange for securing the belt driving and tensioning units and others parts thereto, as hereinafter described.

The aforesaid cross bracing conveniently comprises a plurality of spaced parallel transversely extending tubes 15, (see Figures 2 and 3) the ends of which are secured to the opposed faces of the webs of the channels 14 and opposite ends of mutually adjacent tubes 15 may be connected together by diagonal bracing 16, as indicated in Figure 2.

Conveniently, the bracing tubes 15 are secured to the channels 14 by making each tube of square form in cross section with the sides of the tubes disposed at 45° to the horizontal, considering the units in a horizontal position, as may be seen in Figures 4 and 5, and a pair of vertically spaced bars 17 extends through each tube 15 adjacent the upper and lower corners thereof, the bars 17 being threaded at their ends which project through openings in the webs of the channels 14 to receive nuts 18 for engaging with plates 19 disposed on the outer side of each web in abutment therewith.

Where a long continuously aligned length

of conveyor assembly is required, adjacent belt-supporting units constructed as above described may be connected together by fish plates 20 (see Figure 4) bolted to the lower parts of the webs of the channels 14 at each side of the units.

In an alternative arrangement, which is illustrated in Figures 5 and 6, mutually adjacent and aligned belt-supporting units 10 are connected together by means of strainer cleats 21, comprising L shaped brackets clipped or bolted to the undersides of the attachment flanges at the mutually adjacent ends of these units, the longer limbs of the L shaped brackets being secured to the attachment flanges and the shorter limbs being connected together in spaced relationship by tensioning bolts 22 passing therethrough, the arrangement permitting of adjacent units being secured together in precisely aligned relationship in a particularly rigid manner.

In this last mentioned arrangement the upper flanges of the adjacent side members 14 constituting the adjacent belt-supporting units are connected additionally by fish plates 23 extending immediately beneath the upper horizontally outwardly extending part of these flanges, to which they are secured by bolts 24 extending therethrough and through the fish plates 23.

The belt driving unit 11 and belt tensioning unit 12 are of generally conventional form except that they are intended to be carried and supported from the associated end belt-supporting unit 10 of the assembled conveyor. For this purpose both the belt driving unit 11 and belt tensioning unit 12 embody a pair of transversely spaced longitudinally extending members 25 of angle or other flanged section, on each of which is mounted a pair of longitudinally extending clips 26, adapted to engage with the upper face of the attachment flange aforesaid at the corresponding side of the belt-supporting unit 10 concerned with the longitudinal member of the belt driving or tensioning unit, as the case may be, in engagement with the underside of the corresponding attachment flange.

In the case of the belt tension unit 12, the clips may merely engage slidably with the upper side of each attachment flange aforesaid with the tension of the belt serving to retain the belt tension unit in position on the adjacent end belt-supporting unit but in the case of the belt driving unit 11, the clips 26 aforesaid are preferably provided with fastening screws or bolts 27 for clamping engagement with the appropriate flange (see Figure 7), said clips 26 being welded or otherwise attached to the flanged supporting member 25 of the belt driving unit.

Referring now to Figures 8 and 9, there are shown therein two forms of supporting elements, which are adapted to support the belt-supporting units referred to in spaced relation above the floor or other external support. Referring firstly to Figure 8, the supporting element depicted therein is provided with a roller 29 for supporting the lower or return run or strand of the belt, the supporting element being provided on either side with a support member 30 in the form of a short length of metal formed to a generally channel shaped configuration, the two support members 30 being arranged with the webs of the channels thus formed vertical and with their open mouths facing away from each other. The roller 29 is mounted between the webs of the support members 30 and the axle of said roller 29 is fixed in position by a split pin 31 at one end and an L shaped locking pin 32 at the other end whereby said axle is constrained against rotational movement and movement in a lateral direction. Said support members 30 are mounted on further channel shaped brackets 33, which are themselves connected to the upper ends of support posts 34, which are in turn arranged to engage telescopically in ground engaging members 35, the height of the whole supporting element being adjustable either by means of clamps 36, as shown in Figure 8 or preferably by means of a removable peg passed through a pair of aligned holes, this latter construction being illustrated in Figure 1 and providing a firm and rigid connection. It will be realised in this form of supporting element that the support members 30 are fixed in relation to the support posts 34 and are not pivotable with respect thereto so that with such supporting elements in an operative supporting position, the conveyor belt 37 will be supported in a horizontal or substantially horizontal position.

Referring now to Figure 9, there is depicted therein an alternative form of supporting element which, in this case, allows the belt-supporting unit supported thereby to be disposed in an inclined position with respect to the horizontal. Thus, in this case, the supporting element comprises a pair of U shaped bearing members 38, which are drilled to receive the adjacent end of the axle of a belt-supporting roller 39 (said belt-supporting roller being adapted to support the lower or return run of the belt) and between the arms of each of said U shaped bearing members 38 extends a vertically dependent limb 40 of a substantially L shaped clip member formed of resilient metal, the horizontal limb 41 of which is bent back upon itself to provide a resilient jaw for engaging detachably with the upper side of the corresponding attachment flange 42 of one or, if desired, a pair of end-to-end aligned belt-supporting units 10, beneath which attachment flange or flanges 42 the inner portion of the limb 41 extends.

A clamping bolt or screws 43 is provided in association with each resilient jaw, extending through a hole in the jaw and a hole in the outer end of the limb 41, to which the

jaw is integrally attached so that the bolt 43 passes clear of the outer edge of the attachment flange 42, the arrangement being such that on tightening the bolt or screw 43, the free edge of the jaw is brought into clamping engagement with the upper side of the attachment flange 42.

A channel bracket member 44 is welded to the underside of each U shaped bearing member 38, and said bracket member 44 is connected to support posts and ground engaging members as before. In this arrangement the ground engaging members and support posts of the supporting element may be arranged in a vertical plane and the limb 40 of the L shaped clip is free to pivot about the axis of the roller 39 so as to permit the belt-supporting unit attached to said clip to be inclined to the horizontal.

In the case of the fixed type of supporting element, as illustrated in Figure 8, the resilient clip is formed, as shown, by an integral extension of the upper flange of the supporting member 30.

Where it is desired to connect adjacent belt-supporting units 10 together at different inclinations to the horizontal, the connecting units employed are of two forms, namely, a so-called "inverse bend" form illustrated in Figures 10 and 11 for use where the total angle between the adjacent goods supporting belt sections is less than 180° and a direct bend form, herein called a "convertor unit assembly" and illustrated in Figures 12 and 13, where such total angle is more than 180°.

In the latter event it is only necessary to support the goods supporting run of the endless belt from beneath by a single roller, but in the former case three rollers are necessary, namely, a pair of substantially horizontally spaced end rollers, which engage with the underside of the belt and a central roller disposed at a lower level than that of the end rollers and around the major portion of which the belt passes with its upper side in engagement with the roller periphery.

Referring firstly to the inverse bend assembly as shown in Figures 10 and 11, we provide a pair of side plates 45 connected together in parallel vertical relationship, the three rollers 46, 47, 48, above-mentioned being supported between said plates 45 and there also being provided a pair of horizontally spaced return rollers 49 and 50 for engaging with the upper side of the return run of the belt. In pivotal association with the ends of the shaft of the roller 47 is a pair of laturally spaced brackets 51 projecting beyond one end of the roller supporting plates 45. Said brackets 51, together with the opposite end of the roller supporting plates 45, are flanged outwardly with the flanges disposed vertically or at an inclination to the vertical, and to these flanges constituting end flanges 52, are bolted attachment brackets 53, themselves adapted to be bolted or alternatively clipped by means of clips similar to the clips referred to, to the attachment flanges of the adjacent belt-supporting units and, if desired, to the webs of the side member channels 14, as indicated by bolts 54.

In this arrangement the bracket 51 rotatable on the axle of the roller 47 can be adjusted about the axis thereof in relation to the roller carrying plates 45 in accordance with the desired relative inclination of the two adjacent belt-supporting units.

As will be seen from Figure 10, the roller carrying plates 45 are provided with three elongated holes 55, through which extend the ends of the rollers 46, 47 and 48, and said ends are adapted to be supported in the ring members 56. Said ring members 56 are provided with laterally projecting screwed spigots 57, by means of which the position of each ring member with respect to its associated elongated hole 55 can be adjusted in order to adjust the position of the rollers 46, 47 and 48 in order to suit the belt and installation concerned, the ring member adapted to support the roller 48 being, as shown in Figure 10, carried from a bracket 58 mounted on the side of each roller carrying plate 45.

With the other form of connecting unit, as shown in Figure 12 and 13, we provide attachment brackets 59, which are each flanged at opposite ends so as to form flanges 60, as shown, and to each of said flanges 60 is attached an intermediate bracket 61, a roller 62 for supporting the return run of the belt being carried by an extension of one of the intermediate brackets 61. The pair of attachment brackets 59 are connected pivotally together about the axis of the spindle of the single upper run belt-supporting roller 63 aforementioned so as to permit of the desired relative inclination attachment of the adjacent belt-supporting units.

As shown in Figure 12, the pair of brackets 59 is provided with aligned elongated holes 64 and each end of the spindle of roller 63 is adapted to be supported in a split telescopic ring shaped member 65 provided with a pair of laterally projecting screwed spigots engaging with the flanges 60 and adjustable by means of nuts 66, as shown, so that the position of said ring shaped member 65 can be adjusted. in order to vary the position of the supporting roller 63.

The attachment brackets 59 and also the roller supporting plates 45 are preferably provided, as shown, in Figures 10 to 13, with horizontally extending attachment flanges for securing them to the clips of either of the two forms of supporting unit 10 above mentioned.

As shown in Figure 8, the axial or spindle 67 of each roller in a belt-supporting unit 10 may be cut away at one end in order to provide an abutment surface against which the

free edge of the flange of one of the longitudinal side members 14 of said belt-supporting unit 10 is adapted to engage, the other free edge of the other longitudinal side member 14 then abutting against the other end of the axle or spindle of the roller. By this means said axle or spindle is located against both endwise or lateral movement and also rotational movement.

The above described arrangement permits of an endless belt conveyor being readily assembled to various lengths from a relatively few number of dis-similar parts in a particularly rapid and simple manner, which, in the preferred form of the invention, can utilise for this purpose existing gravity roller conveyor units whereby any available gravity roller conveyor units can readily be utilised for building up an endless belt conveyor.

The present invention further enables an endless belt conveyor to be combined with a gravity roller conveyor in such a manner that the gravity roller conveyor forms an extension to one end of the endless belt conveyor, as by mounting the belt tensioning unit intermediate the ends of one of the gravity roller conveyor units referred to so that the goods to be conveyed pass off the end of the belt on to the gravity rollers in such unit whence they may pass along one or more further gravity roller conveyor units in alignment with the unit carrying the belt tensioning unit, the arrangement permitting, for instance, of the endless conveyor belt advancing the goods horizontally or uphill to a gravity roller conveyor, from which they continue downhill in the known manner. If desired, the belt tension unit itself may carry these gravity rollers arranged beyond the end of the idler belt tension drum of the belt tension unit so as to be disposed immediately beyond the end of the upper run of the endless belt to receive the goods therefrom.

WHAT WE CLAIM IS:—

1. An endless belt conveyor comprising a plurality of belt-supporting units, each unit consisting of a rigid frame and belt-supporting means carried by said frame, means connecting said units in end-to-end relationship to form a belt-supporting structure, a belt drive unit and a belt tensioning unit, and means connecting said belt drive and belt tensioning units respectively to opposite ends of said structure, so that said belt drive and belt tensioning units are carried solely by and from the end unit frames, and an endless conveyor belt extending between said belt drive and tensioning units and having its upper load conveying run carried by said belt-supporting means of said assembled belt-supporting units.

2. An endless belt conveyor according to Claim 1, wherein the belt-supporting units are provided with rollers for supporting the upper or load carrying run of the endless belt.

3. An endless belt conveyor consisting of a plurality of gravity roller conveyor units, each comprising a frame and a plurality of goods-supporting rollers which are mounted rotatably thereon and are spaced apart from one another by a distance sufficiently small as to permit of said units constituting a gravity conveyor when disposed at the appropriate inclination to the horizontal, an endless conveyor belt, the upper run of which is adapted to be supported by said plurality of gravity roller conveyor units acting as belt-supporting sectional frame units, and means for detachably connecting together said gravity roller conveyor units in end-to-end relationship, a belt driving unit and a belt tensioning unit together with means for attaching said belt driving and belt tensioning units to the opposite ends of the assembled gravity roller conveyor units so as to be supported therefrom, as opposed to being supported directly from the floor or other external support.

4. An endless belt conveyor according to any of the preceding claims, wherein the belt-supporting units are mounted on supporting feet adapted to be attached to said units, said supporting feet embodying rollers for supporting the lower or return run of the belt at intervals along the length of the conveyor, the weight of the entire conveyor, including that of the driving and belt tensioning units, being transmitted to the floor or other external support through said supporting feet.

5. An endless belt conveyor according to any of the preceding claims, wherein means are provided for connecting the belt-supporting units pivotally together so as to permit of different units being disposed at different inclinations to the horizontal or, if desired, of some units being horizontal and one or more units being at an inclination to the horizontal for the purpose of transporting a load between different levels.

6. An endless belt conveyor according to any of the preceding claims, wherein the means for attaching the belt driving and belt tensioning units to the belt-supporting units comprise the provision of outwardly extending flanges on said belt-supporting units, said flanges being adapted detachably to receive clips which are provided on the belt driving and tensioning units so as to secure the latter to the belt-supporting units.

7. An endless belt conveyor substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

FORRESTER, KETLEY & CO.,
Chartered Patent Agents,
Central House, 75, New Street,
Birmingham, 2,
and
Jessel Chambers, 88/90, Chancery Lane,
London, W.C.2.

PROVISIONAL SPECIFICATION

Improvements in or relating to Conveyors for Conveying Goods

We, FISHER & LUDLOW LIMITED, a British Company, of Bordesley Works, Clyde Street, Birmingham, 12, in the County of Warwick, do hereby declare this invention to be described in the following statement:—

This invention relates to conveyors for conveying goods and is concerned with such conveyors which are of the endless belt type.

One of the objects of the present invention is to provide a new or improved endless belt conveyor for the foregoing purpose which can readily be built up from a number of units to various desired overall lengths in which the construction is a particularly simple and inexpensive one, and which permits of the assembly being built up in a particularly simple manner.

With this object in view, according to one feature of this invention we provide means for forming an endless belt conveyor installation comprising a plurality of belt supporting units, an endless conveyor belt, means for connecting said units detachably together in end-to-end relationship, a belt drive unit and a belt tensioning unit, and means for attaching said belt drive and belt tensioning units to said belt supporting unit, the arrangement being such that the belt drive and belt tensioning units are supported in the assembled conveyor from the belt supporting units themselves as opposed to being carried independently from the floor or other external support.

In such an arrangement the belt supporting units may embody one or more skid plates for supporting the upper or load carrying run of the endless belt, but preferably the belt supporting units are provided with rollers for supporting this run of the endless belt, and arising from this preferred form of the invention, a further object of the invention is the provision of an endless belt conveyor installation which is constructed from a number of gravity type roller conveyor units.

With this specific object in view according to a further feature of this invention we provide means for forming an endless belt conveyor installation comprising a plurality of gravity roller conveyor units, each comprising a body and a plurality of goods supporting rollers mounted rotatably thereon and spaced apart from one another by a distance sufficiently small as to permit of said units constituting a gravity roller conveyor when disposed at the appropriate inclination to the horizontal, an endless conveyor belt, and means for detachably connecting together a plurality of said gravity roller conveyor units in end-to-end relationship, a belt driving unit and a belt tensioning unit, together with means for attaching said belt driving and belt tension units to the opposite ends of the assembled gravity roller conveyor units so as to be supported therefrom.

In such latter arrangement the gravity roller conveyor units would, in fact, constitute belt supporting units in so far as the rollers thereof supported the upper run of the belt, and in either form of the invention these belt supporting units may be carried directly from the floor or other external support but preferably they would be mounted on supporting elements adapted to be attached to the units which supporting elements would preferably embody rollers for supporting the lower or return run of the belt at intervals along the length of the installation.

The arrangement would accordingly be such that the weight of the entire installation, including that of the driving and belt tensioning units would be transmitted to the floor or other external support through the said supporting elements.

If desired, means may be provided for connecting the belt supporting units pivotally together so as to permit of different units being disposed at different inclinations to the horizontal, or, if desired, of some units being horizontal and one or more units being at an inclination to the horizontal for the purpose of transporting a load between different levels.

The means for attaching the driving and tensioning units to the belt supporting units would preferably comprise the provision of outwardly extending flanges on said belt supporting units, adapted detachably to receive clips provided on the belt driving and tensioning units so as to secure the latter to the supporting units and this same arrangement may be employed for securing the supporting elements referred to, to the belt supporting units, namely the provision on the supporting elements of these clips.

These clips would preferably be of resilient form and may embody screws or bolts for securing a resilient jaw of each clip in engagement with one side, preferably the upper side, of what would then be a horizontally outwardly extending flange.

In one particular arrangement in which each belt supporting unit constituted a gravity roller conveyor unit, these would be of generally conventional form comprising a pair of longitudinal side members formed of sheet metal and bent to channel configuration with the connecting portions of the channels disposed vertically and the mouths of the channels facing in opposite directions with a large number of conveyor rollers of any known or other form supported by the customary close distance, e.g. at 4″ to 6″ pitch, dependent on the diameter of the rollers, between the upper parts of the connecting portions of the channels so

as to be mounted for rotation about spaced parallel axes in the known manner.

The upper flange of each channel may be bent downwardly and inwardly opposite the ends of the roller axles to locate these against undesirable lateral movement after the two channels have been joined together by cross bracing in the known manner, while the lower flange may be bent back upon itself so as to be of double thickness, and provide a relatively rigid attachment flange for securing the belt driving and tensioning units and other parts thereto as hereinafter described.

The bracing referred to may comprise a number of spaced parallel transversely extending tubes, the ends of which would be secured to the opposed faces of the channel connecting portions and opposite ends of mutually adjacent tubes may additionally be connected together by diagonal bracing.

Conveniently the bracing tubes would be secured to the channels by making each tube of square form in cross section with the sides of the tubes at 45° to the horizontal, considering the units in a horizontal position, and a pair of vertically spaced bars may extend through each tube adjacent the upper and lower corners, the bars being threaded at their ends which project through openings in the connecting portions of the channels to receive nuts for engaging with plates disposed on the outer side of each connecting portion in abutment therewith and secured in position by the nuts.

Where a long continuously aligned length of conveyor assembly is required, adjacent belt supporting units constructed as above described may be connected together by fish plates bolted to the lower parts of the channel connecting portions at each side of the units.

The belt driving and belt tensioning units would be of generally conventional form, except that they are intended to be carried from the associated end belt supporting units of the assembled conveyor.

For this purpose, both the belt driving unit and the belt tensioning unit embody a pair of transversely spaced longitudinally extending members of angled or other flanged section, on each of which is mounted a pair of longitudinally extending clips adapted to engage with the upper face of the attachment flange aforesaid at the corresponding side of the belt supporting unit concerned with the longitudinal member of the belt driving and tensioning unit, as the case may be, in engagement with the underside of the corresponding attachment flange.

In the case of the belt tension unit the clips may merely engage slidably with the upper side of each attachment flange aforesaid, with the tension of the belt serving to retain the belt tension unit in position on the adjacent end belt supporting unit but in the case of the belt driving unit the clips aforesaid would preferably be provided with fastening screws or bolts for clamping engagement with the appropriate flange.

Where it is desired to support the belt supporting units referred to in spaced relation above the floor or other external support, we provide supporting elements which also embody rollers for supporting the lower or return run of the belt, each of such supporting elements comprising a base of generally channel configuration when viewed longitudinally of the assembled installation with each side of the channel being constituted by a U shaped bearing member which receives the adjacent end of the belt supporting roller referred to and between the arms of each of these U shaped bearings extends the shorter vertically depending limb of a substantially L shaped clip member formed of resilient metal, the longer horizontal limb of which is bent back upon itself to provide a resilient jaw for engaging detachably with the upper side of the corresponding attachment flange of one, or, if desired, a pair of end-to-end aligned belt supporting units beneath which attachment flange or flanges the inner portion of the longer limb aforesaid of the clip member would extend.

A clamping bolt or screw is provided in association with each resilient jaw, extending through a hole in the jaw and a hole in the outer end of the limb proper, to which the jaw is integrally attached so that the bolt passes clear of the outer edge of the attachment flange, the arrangement being such that on tightening the bolt or screw as the case may be, the free edge of the jaw is brought into clamping engagement with the upper side of the attachment flange.

With such an arrangement the channel base of each supporting element is free to pivot about the axis of the associated roller in relation to the shorter depending limb of the L shaped clip member so as to permit of the supporting element being attached to a belt supporting unit itself inclined to the horizontal with the channel shaped member of the supporting element horizontal.

Secured rigidly to the underside of each of the U shaped arms of the channel is a bracket of inverted channel configuration, the two dependent arms of which would be secured in any convenient manner to a vertically adjustable trestle forming part of the supporting element and provided with feet for engaging with the floor or other external support, the arrangement permitting of the same supporting element to be employed with the trestle adjusted to different heights in the case where the distance between the underside of the belt supporting units and the floor or other external support is variable.

Where it is desired to connect adjacent belt supporting units together at different inclinations to the horizontal, the connecting units employed would be of two forms, namely, an

inverse bend form for use where the total angle between the adjacent goods supporting belt sections was less than 180° and a direct bend form where such total angle was more than 180°.

In the latter event it would be required merely to support the goods supporting run of the endless belt from beneath by a single roller but in the former case three rollers would be necessary, namely, a pair of substantially horizontally spaced end rollers which engaged with the underside of the belt, and a central roller disposed at a lower level than that of the end rollers and around the major portion of which the belt would pass with its upper side in engagement with the roller periphery.

This first form of connecting unit may, for instance, comprise a pair of side plates connected together in parallel vertical relationship between which would be supported the three rollers above mentioned, together with a pair of horizontally spaced return rollers for engaging with the upper side of the return run of the belt, and in pivotal association with the ends of the shaft of one of the return rollers would be a pair of laterally spaced brackets which would project beyond one end of the roller supporting plates referred to.

These brackets, together with the opposite end of the roller supporting plates, would be flanged outwardly, with the flanges disposed vertically or at an inclination to the vertical and to these flanges, constituting end flanges, would be bolted attachment brackets themselves adapted to be bolted or alternatively clipped by means of clips similar to the clips referred to, to the attachment flanges of the adjacent belt supporting units, to the connecting portions of the side member channels of which they may additionally be bolted.

In such an arrangement the brackets rotatable on the one roller spindle can be adjusted about the axis thereof in relation to the roller carrying plates in accordance with the desired relative inclination of the two adjacent belt supporting units.

With the other form of connecting unit the attachment brackets referred to would be provided and each of the vertical or substantially vertical flanges thereof would be secured to a pair of intermediate brackets connected pivotally together about the axis of the spindle of the single upper run belt supporting roller aforementioned so as to permit of the desired relative inclination attachment of the adjacent belt supporting units while one of these attachment brackets would carry a single roller for supporting the return run of the belt.

The attachment brackets aforementioned, together with, if desired, the roller supporting plates in the inverse bend connecting unit above described, would preferably be provided with horizontally extending attachment flanges for securing them to the clips of the supporting elements above mentioned.

Instead of connecting mutually adjacent aligned belt supporting units by simple fish plates, they may be connected additionally or alternatively by strainer cleats comprising L shaped brackets clipped or bolted to the undersides of the attachment flanges at the mutually adjacent ends of these units, the longer limbs of the L shaped brackets being secured to the attachment flanges and the shorter limbs being connected together in spaced relationship by tensioning bolts passing therethrough, the arrangement permitting of adjacent units being secured together in precisely aligned relationship in a particularly rigid manner.

In this last mentioned arrangement the upper flange of the side members constituting each belt supporting unit would be connected additionally by fish plates extending immediately beneath the upper horizontally outwardly extending part of this flange, to which they would be secured by bolts extending therethrough and through the fish plates.

The present arrangement permits of an endless belt conveyor being readily assembled to various lengths from a relatively few number of dis-similar parts in a particularly rapid and simple manner which, in the preferred form of the invention, can utilise for this purpose existing gravity roller conveyor units, whereby any available gravity roller conveyor units can readily be utilised for building up an endless belt conveyor.

The present invention further enables an endless belt conveyor to be combined with a gravity roller conveyor in such a manner that the gravity roller conveyor forms an extension to one end of the endless belt conveyor as by mounting the belt tensioning unit intermediate the ends of one of the gravity roller conveyor units referred to so that the goods to be conveyed pass off the end of the belt on to the gravity rollers in such unit whence they may pass along one or more further gravity roller conveyor units in alignment with the unit carrying the belt tensioning unit, the arrangement permitting, for instance, of the endless conveyor belt advancing the goods horizontally or uphill to a gravity roller conveyor from which they continue downhill in the known

manner. If desired, the belt tension unit itself may carry these gravity rollers arranged beyond the end of the idler belt tension drum of the belt tension unit so as to be disposed immediately beyond the end of the upper run of the endless belt to receive the goods therefrom.

FORRESTER, KETLEY & CO.,
Chartered Patent Agents,
Central House, 75, New Street,
Birmingham, 2,
and
Jessel Chambers, 88/90, Chancery Lane,
London, W.C.2.

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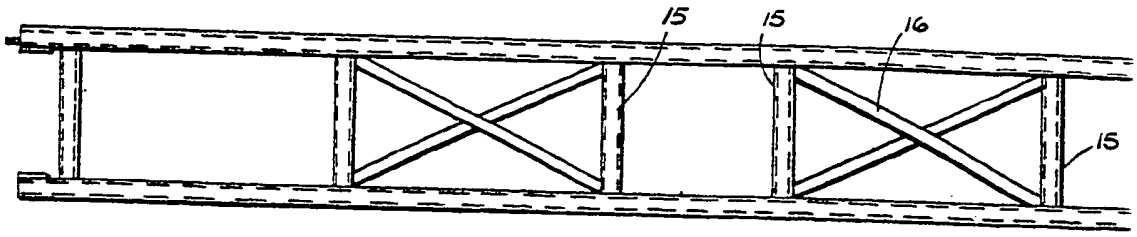


Fig. 2.

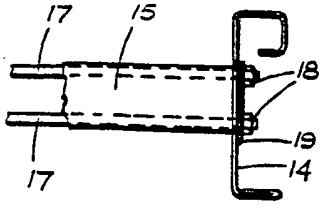
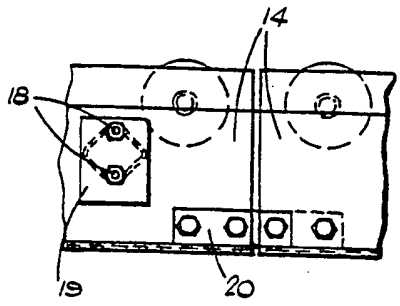


Fig. 3.



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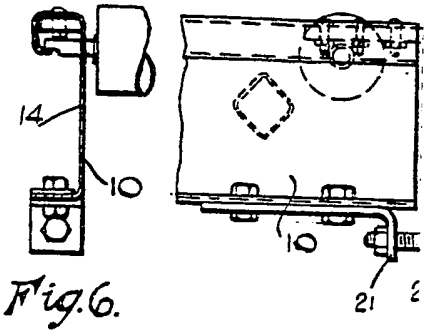

Fig. 6.

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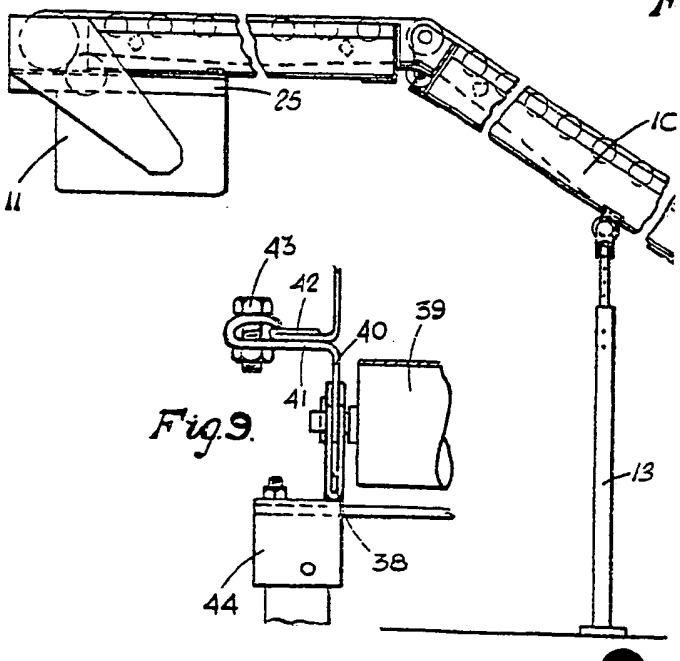

Fig. 9.

828,449 COMPLETE SPECIFICATION

4 SHEETS

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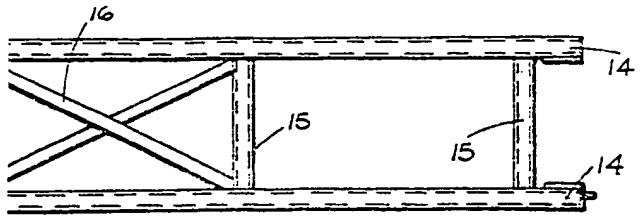
SHEET 1



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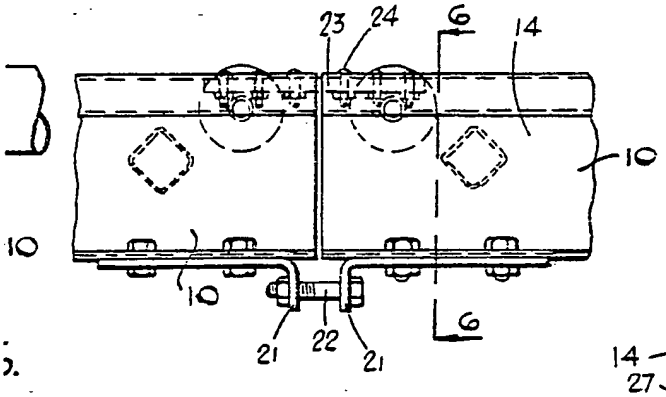

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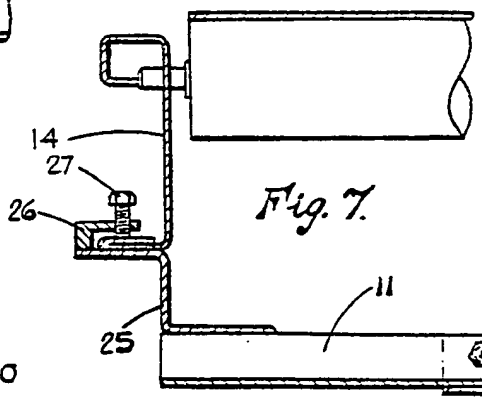

Fig. 7.

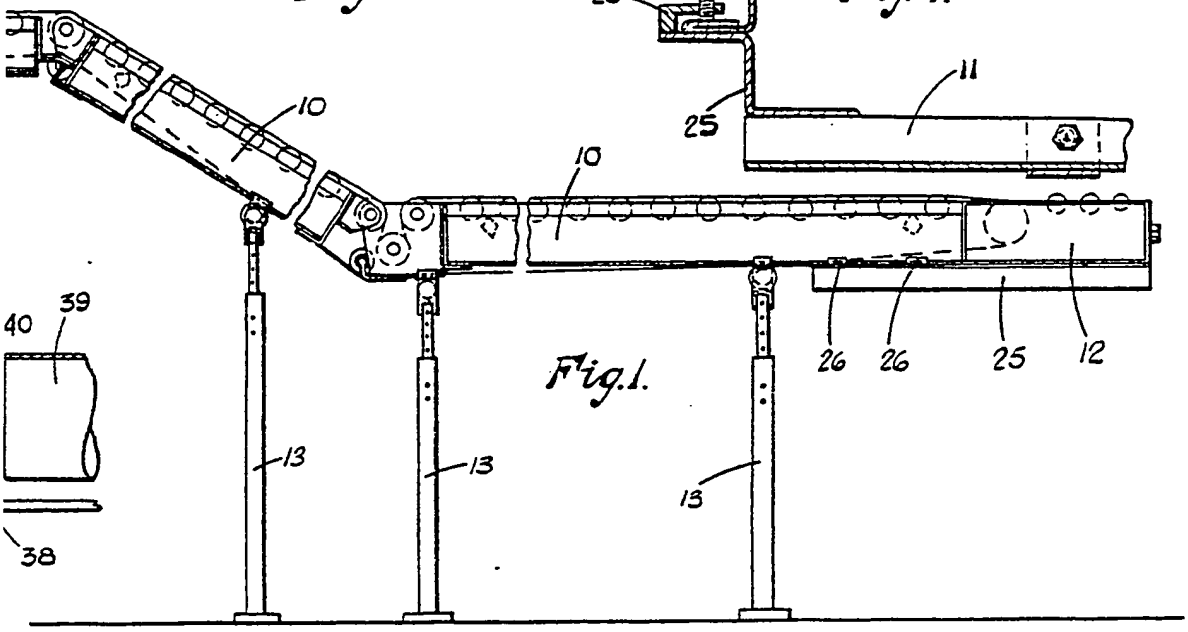

Fig. 1.

828,449 COMPLETE SPECIFICATION
4 SHEETS

SHEET 1

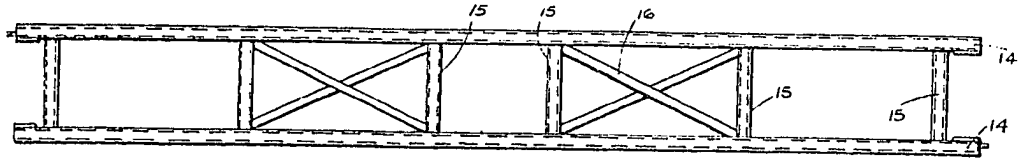

Fig. 2.

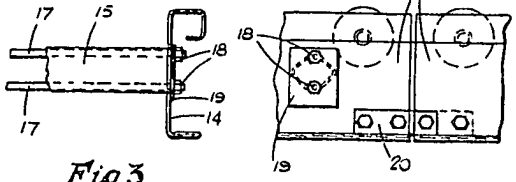

Fig. 3.

Fig. 4.

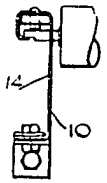

Fig. 6.

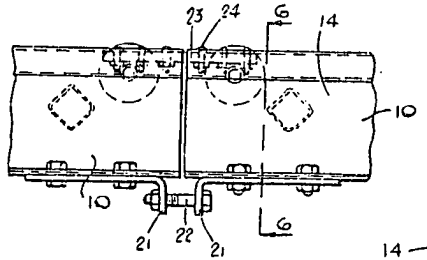

Fig. 5.

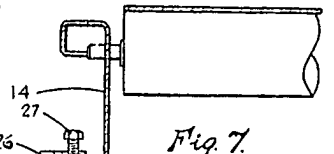

Fig. 7.

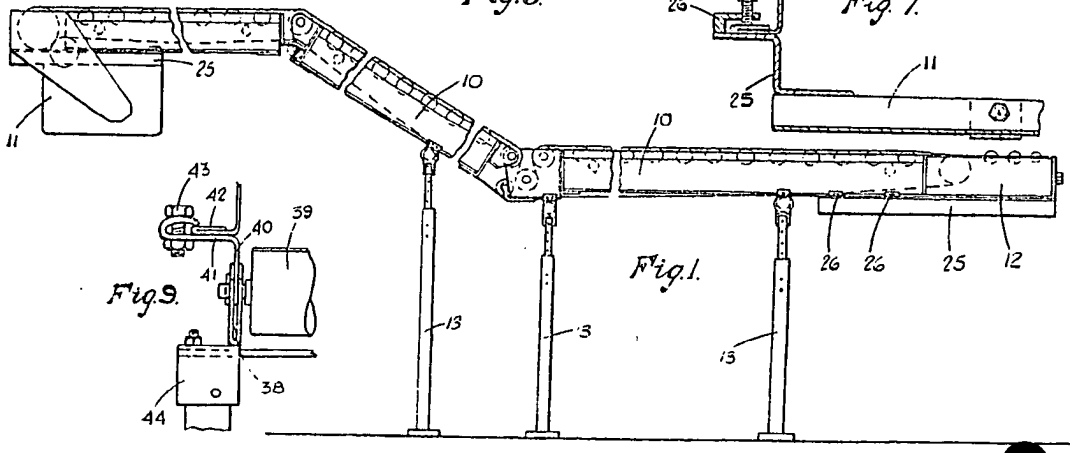

Fig. 1.

Fig. 9.

828,449 COMPLETE SPECIFICATION

4 SHEETS

This drawing is a reproduction of the Original on a reduced scale.

SHEET 2

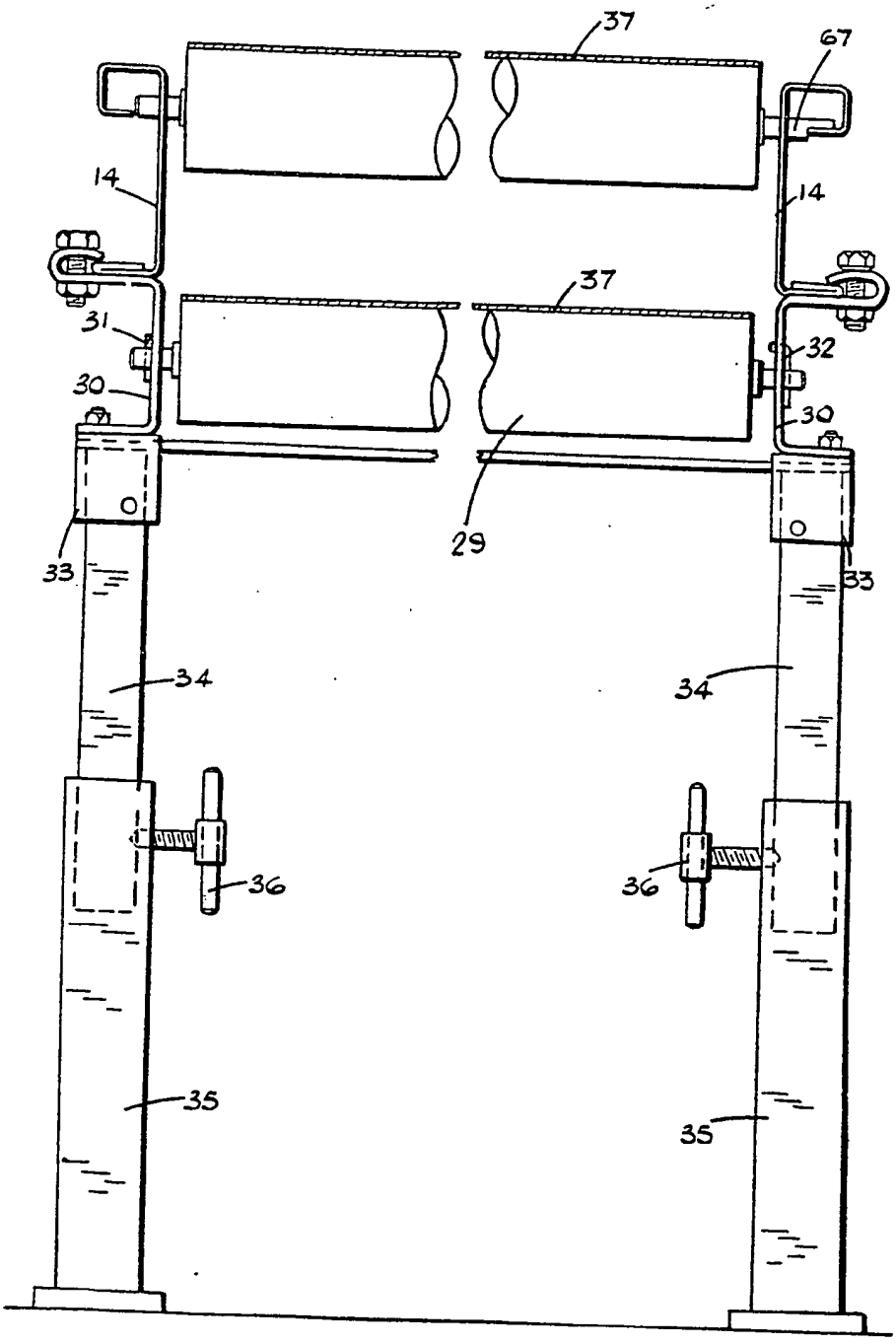

Fig.8.

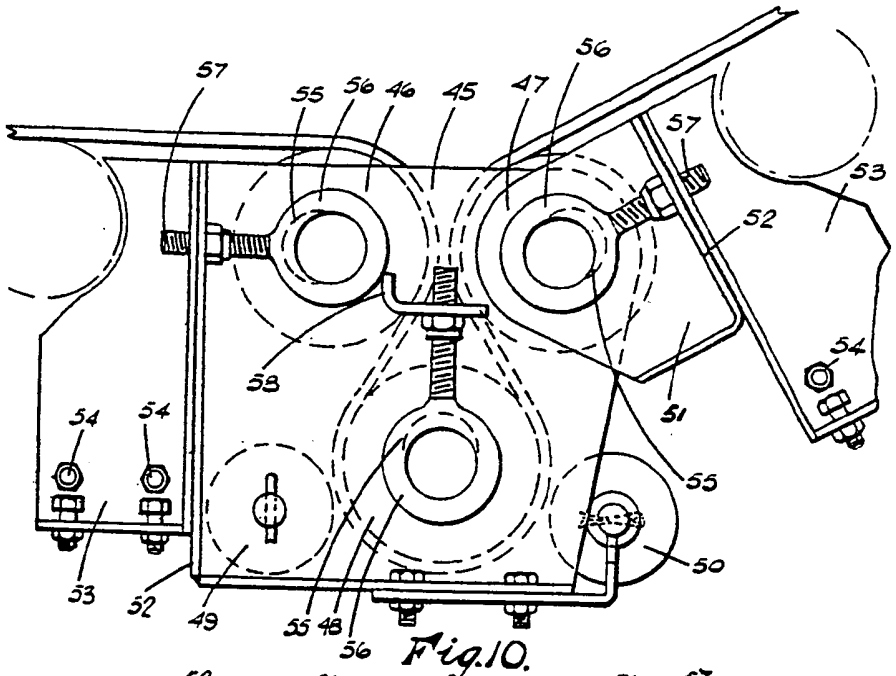
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Fig. 10.

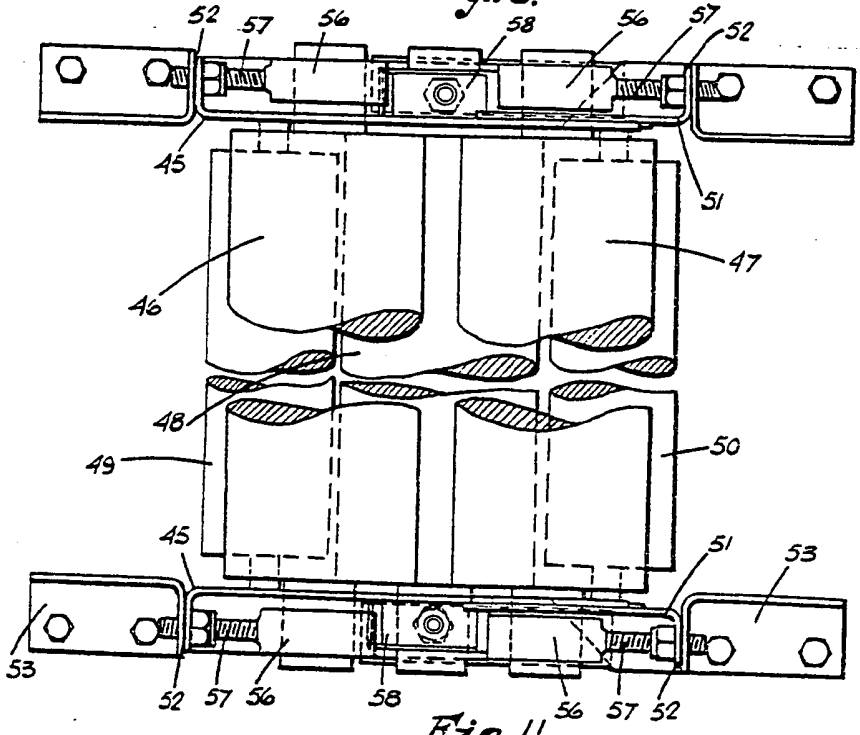
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Fig. 11.

828,449 COMPLETE SPECIFICATION

4 SHEETS

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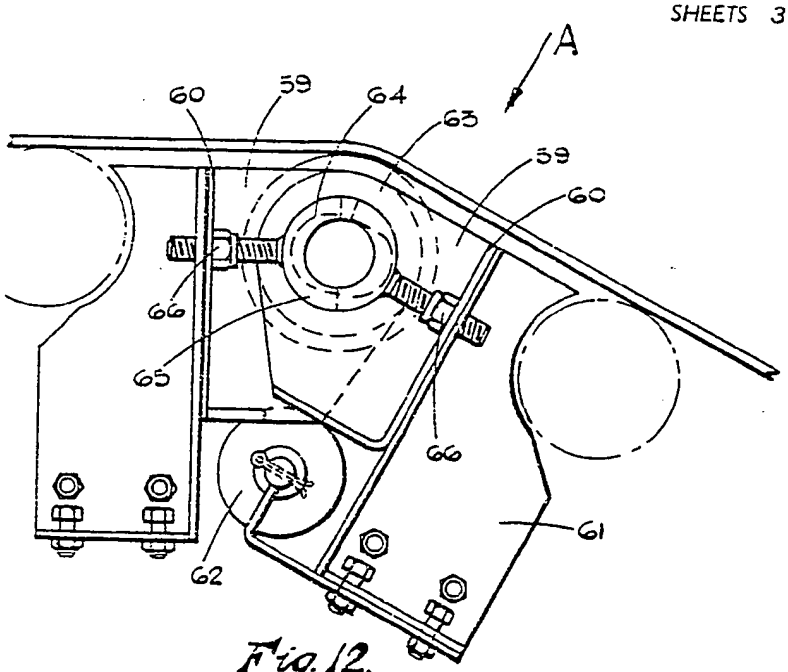
SHEETS 3 & 4



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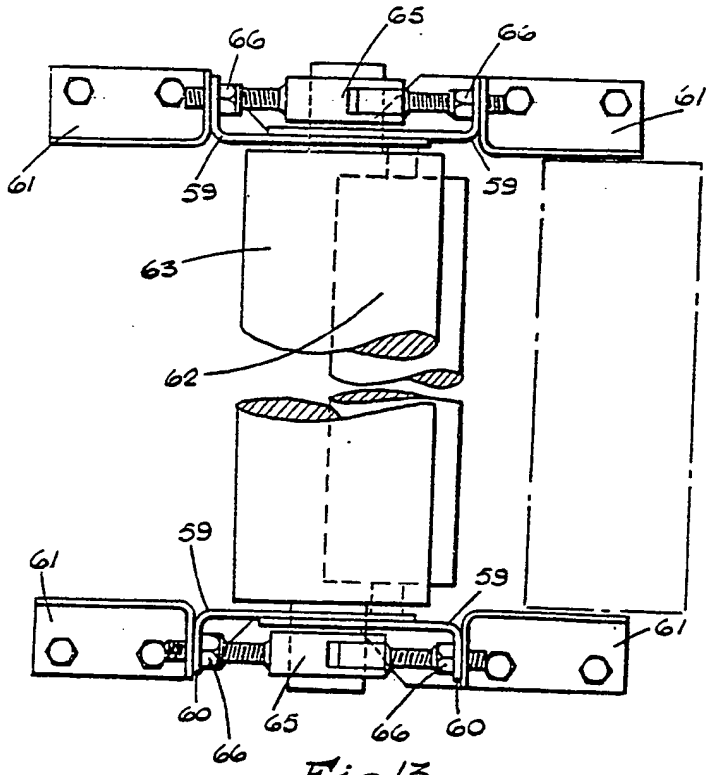

Fig. 13.

828,449 COMPLETE SPECIFICATION
4 SHEETS
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SHEETS 3 & 4

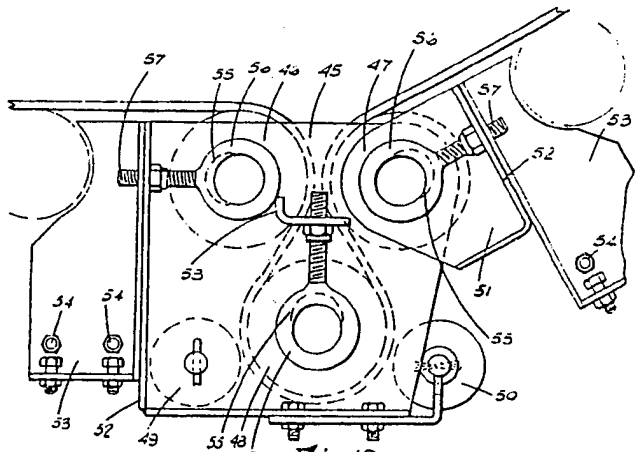

Fig. 10.

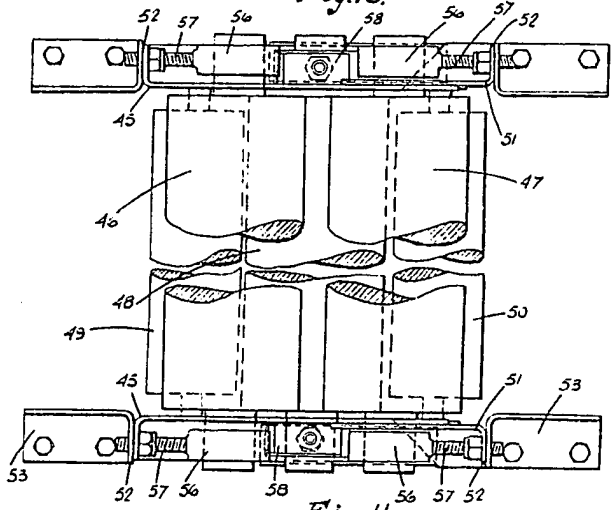

Fig. 11.

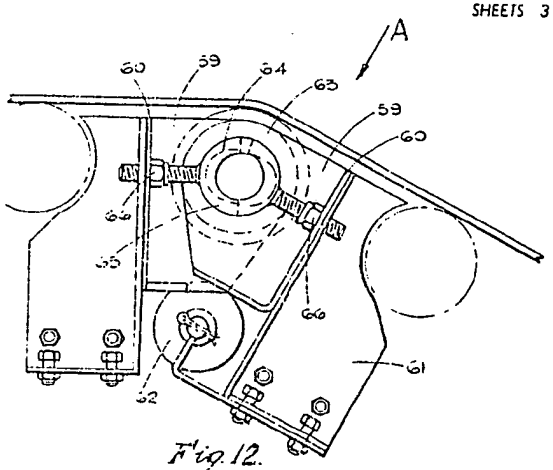

Fig. 12.

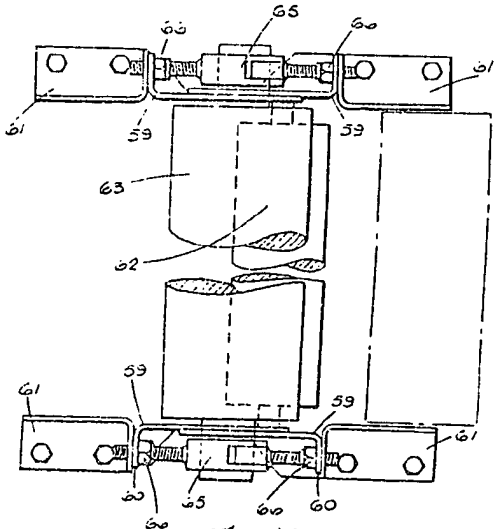

Fig. 13.